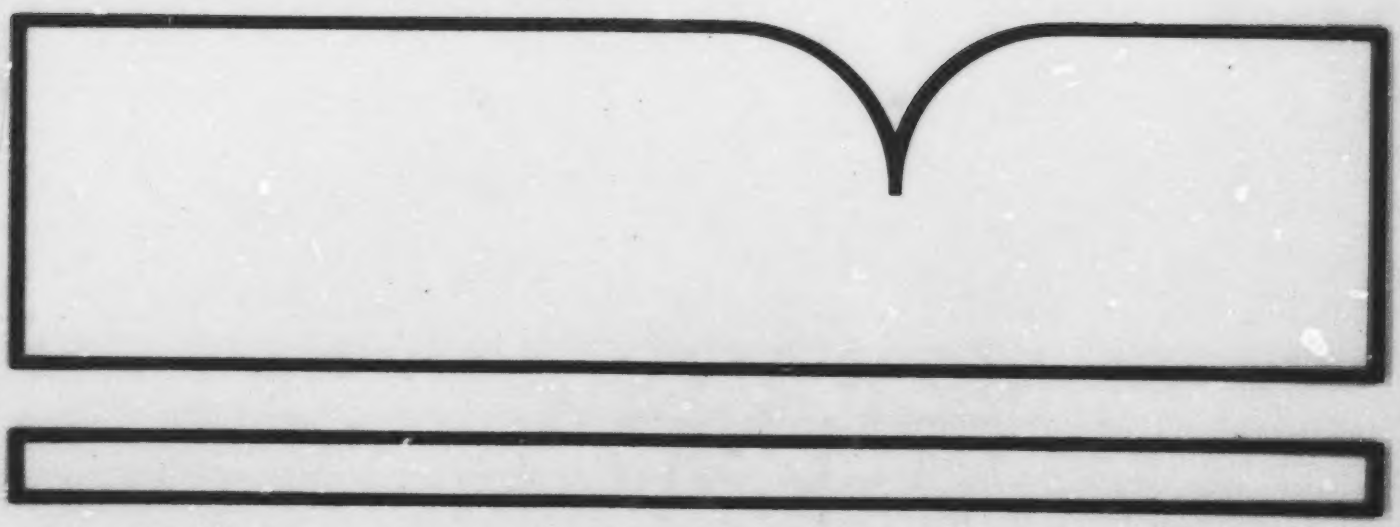
PB85-214062

Superfund Record of Decision (EPA Region 7)
Aidex Site, Council Bluffs, Iowa
September 1984

(U.S.) Environmental Protection Agency
Washington, DC

30 Sep 84



U.S. Department of Commerce
National Technical Information Service
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United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R07-84/003
September 1984

PB85-214062

EPA

Superfund Record of Decision:

Aidex Site,IA

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16. ABSTRACT

The Aidex Corporation operated a pesticide formulation facility near Council Bluffs, Iowa between 1974 and 1981. More than 4,000 barrels of pesticides and pesticide wastes were stored or buried on the property. The soil, shallow zone of ground water and surface water are contaminated with pesticides and related wastes.

The cost-effective remedial alternative selected for this site includes: excavation and off-site disposal of buried wastes and contaminated soil in excess of 10ppm total pesticides; backfilling with clean soil and grading and seeding of the site; expansion of the monitoring well network and biannual ground water testing; vacuuming and washing interior surfaces, floors and walls of the buildings onsite. The total present worth cost of the selected alternative is $3,580,175 which includes the $875,000 O&M costs for thirty years of ground water monitoring.

Key Words: ACLs, Ground Water Contamination, Ground Water Monitoring, Contaminated Soil, Excavation, Pesticides, Background Levels, Capping, RCRA Closure Requirements, Off-site Disposal, On-Site Disposal

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Record of Decision Aidex, Council Bluffs, IA Contaminated media: gw, soil Key contaminants: pesticides, VOCs		

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ROD ISSUES ABSTRACT

Site: Aidex, Council Bluffs, Iowa

Region: VII

AA, OSWER
Briefing: June 19, 1984

SITE DESCRIPTION

The Aidex Corporation operated a pesticide formulation facility near Council Bluffs, Iowa between 1974 and 1981. More than 4,000 barrels of pesticides and pesticide wastes were stored or buried on the property. The soil, shallow zone of ground water and surface water are contaminated with pesticides and related wastes.

SELECTED ALTERNATIVE

The cost-effective remedial alternative selected for this site includes: excavation and off-site disposal of buried wastes and contaminated soil in excess of 10 ppm total pesticides; backfilling with clean soil and grading and seeding of the site; expansion of the monitoring well network and biannual ground water testing; vacuuming and washing interior surfaces, floors and walls of the buildings onsite. The total present worth cost of the selected alternative is $3,580,175 which includes the $875,000 O&M costs for thirty years of ground water monitoring.

ISSUES AND RESOLUTIONS

1. Ground water contamination has been detected in the shallow aquifer below the site. There is no evidence of significant migration of contaminants offsite which would pose a public health threat. As part of the remedial action, periodic ground water monitoring will be conducted for 30-years to detect any unexpected spread of contaminated ground water. The final decision on the remedy for the contaminated ground water will be deferred until Alternate Concentrations Limits (ACLs) are developed for the site.

2. The amount of contaminated soil and waste which will be excavated and transported for off-site disposal will be determined by a 10 ppm total pesticide standard. The 10 ppm total

KEY WORDS

- Alternate Concentration Limits (ACLs)
- Ground Water Contamination
- Ground Water Monitoring

- Contaminated Soil
- Excavation
- Pesticides

ISSUES AND RESOLUTIONS	KEY WORDS
pesticide standard was selected because it is consistent with the recommended application rates (2-5 ppm) of the various pesticides in normal use throughout the State and will result in individual pesticide residuals comparable to peak background levels.	. Background Levels
3. Capping of the contaminated soil (without soil removal) in accordance with RCRA closure requirements was rejected as a cleanup alternative because of the high ground water table at the site which may periodically inundate the wastes.	. Capping
4. The removal of pesticide - contaminated soils to near background levels of total pesticides along with backfilling with clean soil eliminates the need for a RCRA cap. Therefore, the selected remedial alternative is consistent with RCRA closure requirements.	. Background Levels . Capping . RCRA Closure Requirements
5. Excavation and on-site disposal was considered as a remedial alternative. However, off-site disposal was selected because it was judged to be more cost-effective than on-site disposal, primarily because of the costs of constructing such a facility over a localized clay layer with unknown load bearing capacity.	. Excavation . Off-Site Disposal . On-Site Disposal

Record of Decision
Remedial Alternative Selection

SITE:

Aidex Corporation, Council Bluffs, Iowa.

DOCUMENTS REVIEWED:

I am basing my decision primarily on the following documents describing the analysis of the cost effectiveness of remedial alternatives for the Aidex Corporation Site:

- o Remedial Investigation and Feasibility Study Report, Aidex Corporation, Council Bluffs, Iowa, December 1983.
- o State and EPA staff summaries and recommendations.

DESCRIPTION OF SELECTED OPTIONS:

- o Buried wastes will be excavated within the relative perimeter of the disposal trench to a residual concentration of less than 10 ppm and transported off-site for disposal in a secure landfill.
- o Soils contaminated in excess of 10 ppm total pesticides will be excavated and transported off-site for disposal in a secure landfill.
- o Soils in areas of the site contaminated to levels less than 10 ppm pesticides will be graded where necessary to promote drainage and seeded.
- o The monitoring well network will be expanded by adding two wells to monitor mid-range and deep water quality downgradient from the site.
- o Buildings will be vacuumed to remove loose dust from all accessible interior surfaces and floor and walls will be washed.
- o O&M Requirements:
  - All monitoring wells will be tested biannually for 30 years or until a determination is made that the site no longer poses a threat to nearby drinking water supply wells.

Consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), and the National

Contingency Plan (40 CFR Part 300), I have determined that remedies described above for the Aidex Corporation Site are cost effective and provide adequate protection of public health, welfare, and the environment. The State of Iowa has been consulted and agrees with the approved remedy. In addition, the action will require future operation and maintenance activities to ensure the continued effectiveness of the remedy. These activities will be considered part of the approved action and are eligible for Trust Fund monies for a period of one year.

EPA will defer action on the remedy for the on-site ground water until the Agency can make a determination on Alternate Concentration Limits (ACL's) for the site.

I have also determined that the action being taken is appropriate when balanced against the availability of Trust Fund monies for use at other sites. In addition, the off-site transport and secure disposition of buried wastes and contaminated soils is more cost effective than other remedial alternatives.

9/30/84
Date

Lee M. Thomas
Assistant Administrator
Office of Solid Waste and Emergency Response

Summary of Remedial Alternative Selection
Aidex Corporation Site
Council Bluffs, Iowa

SITE LOCATION AND DESCRIPTION

The Aidex site, which covers approximately 20 acres, is located in a rural area of Mills County, Iowa about 7 miles south-southeast of Council Bluffs, Iowa, and lies near the Missouri River floodplain. The distance to the Missouri River channel is about three miles. The property is bounded on the west by the St. Mary°s drainage ditch, the major drainage ditch in this part of the floodplain, on the north and east by a county road, and on the south by a cultivated field. Forty-two (42) shallow domestic water wells have been identified within a two mile radius of the site, and two residences are located within 1/4 mile of the site.

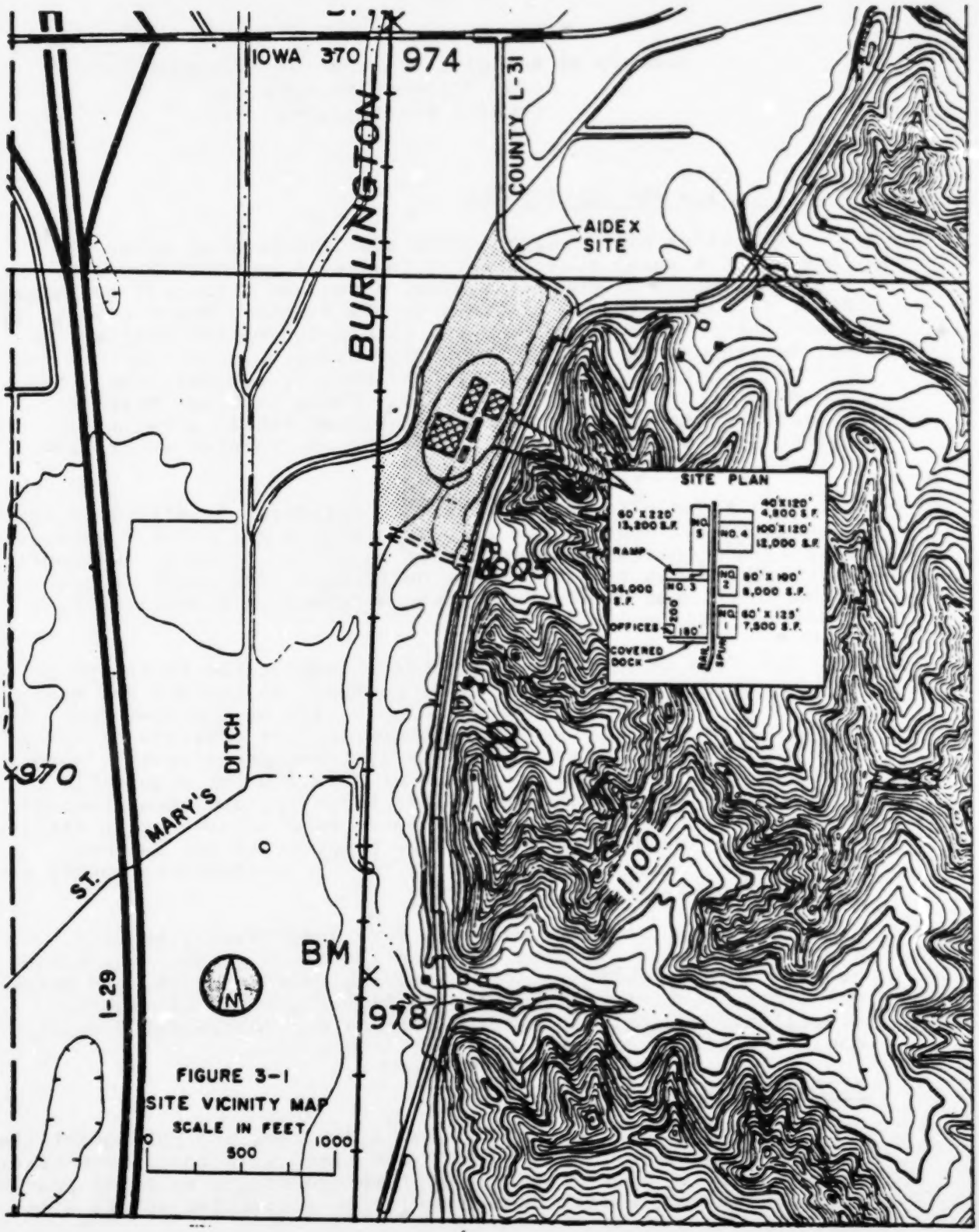
The Aidex site consists of four buildings totalling 66,000 square feet of space. The buildings are of all steel construction with 7-inch concrete floors placed on fill. At least two septic tanks were known to serve these buildings. The plant is also connected to the nearby Burlington Northern railroad line by a 1550-foot rail siding.

The City of Glenwood, Iowa holds legal title to the property and improvements. In April 1975, pursuant to the Act For Municipal Support of Industrial Projects, Chapter 419 of the Iowa Code, as amended, the City purchased the property from officers of Aidex; authorized the issuance of industrial development revenue bonds, in the aggregate principal amount of $760,000 for acquisition, construction and improvement of the property; and then "leased" the property back to Aidex. The bonds were secured by an assignment of the lease and a lien in the property to Toy National Bank, Sioux City, Iowa, as Trustee for the bondholders, under an Indenture of Trust and Mortgage.

Before any remedial measures were undertaken, the site contained 3400 drums, many of which contained wastes, one buried tank containing 8,000 gallons of contaminated sludges, one below-grade open concrete pit containing 34,000 gallons of liquid, miscellaneous scattered debris, extensively contaminated soils and two burial trenches.

SITE HISTORY

As a formulator of pesticides, Aidex received bulk quantities of concentrated pesticides which were mixed with inert materials, solvents, oils, synergists and perfumes to create saleable products. Liquid hazardous wastes from formulation activities at the site


IOWA 370
974
BURLINGTON
COUNTY L-31
AIDEX SITE
SITE PLAN
60' X 220'
13,200 S.F.
NO. 5
40'X120'
4,800 S.F.
NO. 4
100'X120'
12,000 S.F.
RAMP
NO. 3
36,000 S.F.
200'
180'
NO. 2
90' X 100'
9,000 S.F.
NO. 1
60' X 125'
7,500 S.F.
OFFICES
COVERED DOCK
RAIL SPUR
970
MARY'S
ST.
DITCH
1100
BM
978
I-29
N
FIGURE 3-1
SITE VICINITY MAP
SCALE IN FEET
0
500
1000

were accumulated and stored in a reconditioned 8,000 gallon underground storage tank. Solid process wastes were stored in drums, many of which were left open to the elements and were allowed to deteriorate and leak their contents into the environment. Process wastes were also disposed of in two burial trenches onsite.

In November 1976, a fire destroyed the liquid formulation building at the facility. An estimated 100,000 gallons of water were used to extinguish the fire. Chemical contamination of the local plant drainage ways and property was subsequently documented by EPA investigators. Following the fire, plant production was greatly reduced and the company filed a petition for reorganization under Chapter 11 of the Bankruptcy Act in February 1979. In July 1981, the proceedings were converted to Chapter 7 bankruptcy, and Aidex was adjudicated bankrupt.

During a July 1981 bankruptcy sale held at the site to liquidate the assets of the Corporation, ethoprop (Mocap) dust was spilled during an attempted removal of a baghouse dust collector which resulted in two workmen being hospitalized with organophosphate poisoning. The EPA responded by coordinating cleanup activities. It was also noted that two large metal tanks were drained into a concrete-lined pit at the site of the former atrazine formulation building. These two incidents are believed to be contributing factors to the contaminated conditions at the site.

The Aidex site was placed on the proposed National Priorities List (NPL) in October 1981. This designation became final in August 1983. During December 1981, immediate removal funds were used to fence the site to control access.

In September 1982, Black and Veatch Engineers-Architects completed a Remedial Action Master Plan which included recommendations for initial remedial measures (IRM) to abate the deteriorating site conditions. The State and EPA agreed that measures to limit public exposure and prevent wastes from migrating off-site were needed even while further remedial investigation and feasibility studies were underway. The State of Iowa signed a Superfund State contract on October 19, 1982, to pledge a 10 percent match of remedial costs. The State and EPA also agreed that the IRM would proceed in two phases. Black and Veatch was tasked to develop a bid package for each phase. The EPA then entered into an Interagency Agreement with the U.S. Army Corps of Engineers to procure cleanup contractors and to provide oversight during the implementation of the IRM. A Record of Decision for the IRM was signed August 22, 1983.

Phase I of the IRM was completed on August 31, 1983, by D°Appolonia Waste Management Services of Pittsburg, Pennsylvania. Work included on-site collection, bulking and temporary staging of pesticide-contaminated solids, liquids and sludges, analysis

of collected wastes, construction of an interceptor drainage ditch around a portion of the site and off-site transport and disposal of bulk liquid wastes. Liquid wastes were disposed of by deep well injection at Empak, Inc., Deer Park, Texas.

Phase II of the IRM was completed April 5, 1984, by Rollins Environmental Services, Inc. of Bridgeport, New Jersey. During this phase, the materials which were packaged and stored during Phase I were transported to Rollins facilities at Deer Park, Texas or Logan, New Jersey for incineration or secure land disposal.

CURRENT SITE STATUS

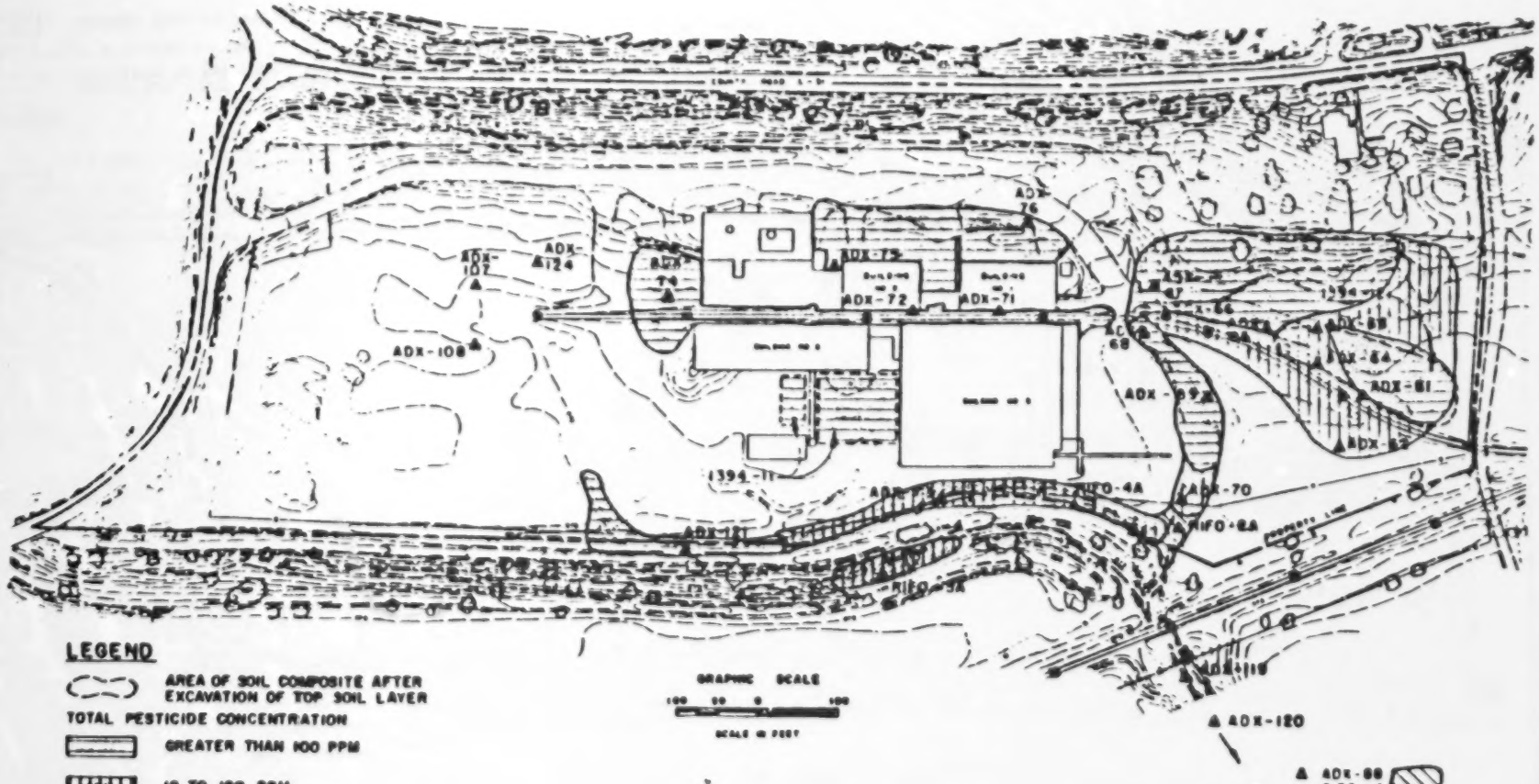
The Aidex site has been the subject of several in-depth, multi-phase investigations. The results of these investigations demonstrate that the Aidex site is widely, and in some areas, heavily contaminated with a variety of chemicals, principally organochlorine, organophosphate and s-triazine pesticides.

Seventeen different pesticides have been identified in soils at this site. The consolidated results of all soil testing is shown in the figures designated 3-15, 3-16, 3-17, and 3-18 (attached). The areas of heaviest contamination show disulfoton (4400 ppm), atrazine (2200 ppm), aldrin (3400 ppm), prometon (480 ppm), chlordane (670 ppm), toxaphene (380 ppm), heptachlor (250 ppm), and ethoprop (74 ppm). These numbers represent levels which are 500-1000 times the normal application rate for specific pesticide compounds. Generally pesticides applied according to the manufacturer°s instructions result in 1-3 ppm of active ingredient on soils immediately after application.

The two burial trenches identified onsite are estimated to contain 154,000 pounds of powdered ethoprop. Other chemicals may also be present in the trenches.

The shallow zone of ground water and subsurface soils have also been contaminated with pesticides. The alluvial aquifer beneath the site is separated into two zones by a soft clay layer. (See hydrogeologic cross section on the following page.) The deeper zone is used for drinking water and irrigation by near-by residents. The soft clay layer as well as localized artesian conditions are apparently acting to restrict, but not prevent the migration of contaminants into the deeper zone of the aquifer.

Analyses of fauna samples collected by the U.S. Fish and Wildlife Service indicate that organochlorine pesticides from Aidex have entered the food chain. The lack of vegetation over large areas of the site indicates that residual levels of herbicides remain highly phytotoxic five years after site operations ceased.



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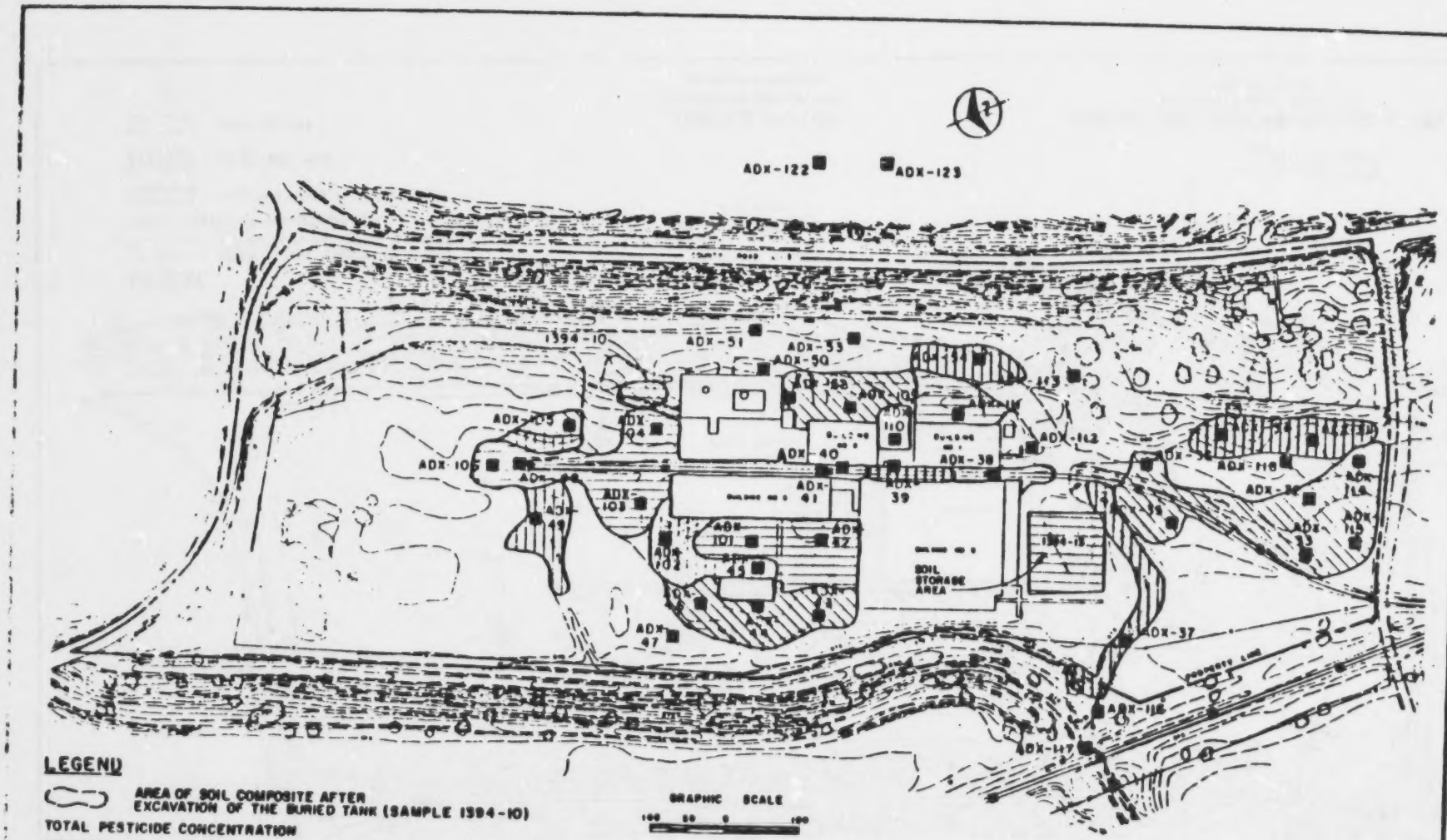
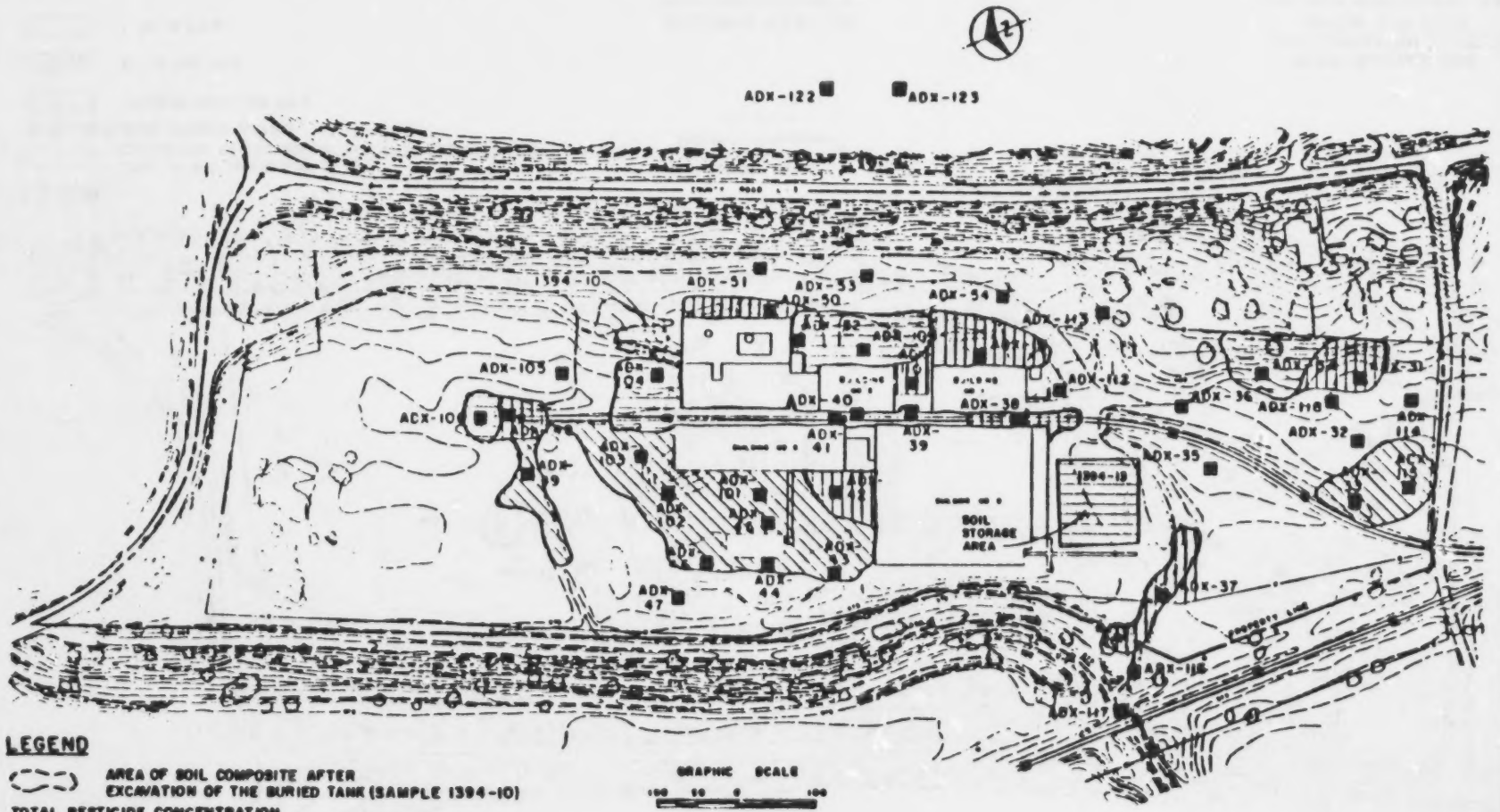


BLACK & VEATCH
ENGINEERS-ARCHITECTS
KANSAS CITY, MISSOURI

NEAR-SURFACE SOIL CONTAMINATION LEVELS DEPTH 0-1 FOOT
NOVEMBER 1982 - AUGUST 1983
FIGURE 3-16



LEGEND

AREA OF SOIL COMPOSITE AFTER EXCAVATION OF THE BURIED TANK (SAMPLE 1394-10)

TOTAL PESTICIDE CONCENTRATION

- GREATER THAN 100 PPM
- 10 TO 100 PPM
- 1 TO 10 PPM

GRAPHIC SCALE

100 50 0 100

SCALE IN FEET

BLACK & VEATCH
ENGINEER-ARCHITECTS
KANSAS CITY, MISSOURI

NEAR-SURFACE SOIL CONTAMINATION LEVELS DEPTH 1-2 FOOT
NOVEMBER 1982 - AUGUST 1983
FIGURE 3-17

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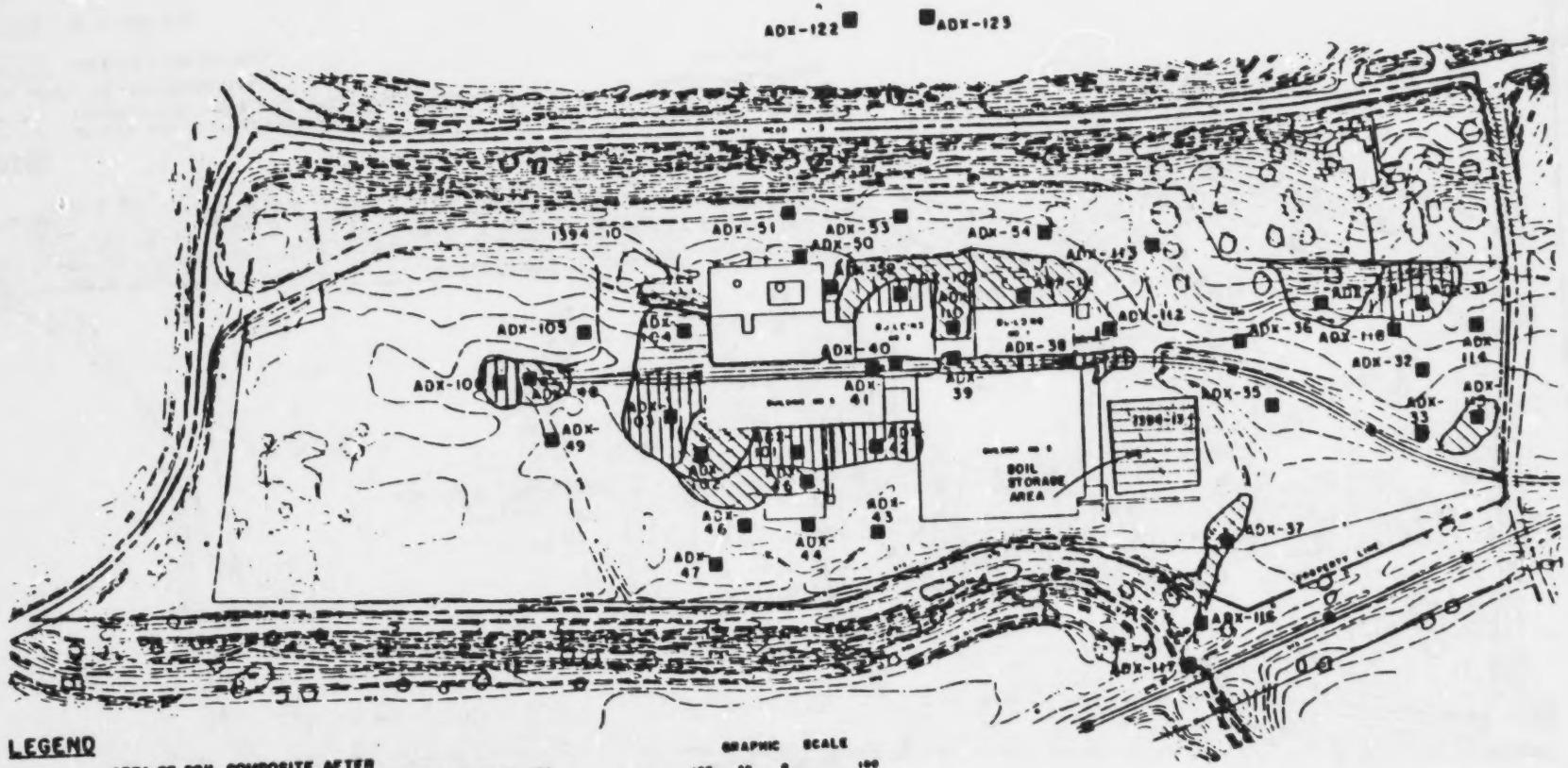
3.2



LEGEND

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- GREATER THAN 100 PPM
- 10 TO 100 PPM
- 1 TO 10 PPM

BLACK & VEATCH
ENGINEERS-ARCHITECTS
KANSAS CITY, MISSOURI

NEAR-SURFACE SOIL CONTAMINATION LEVELS DEPTH 2-3 FOOT
NOVEMBER 1982 - AUGUST 1983
FIGURE 3-18

3-4

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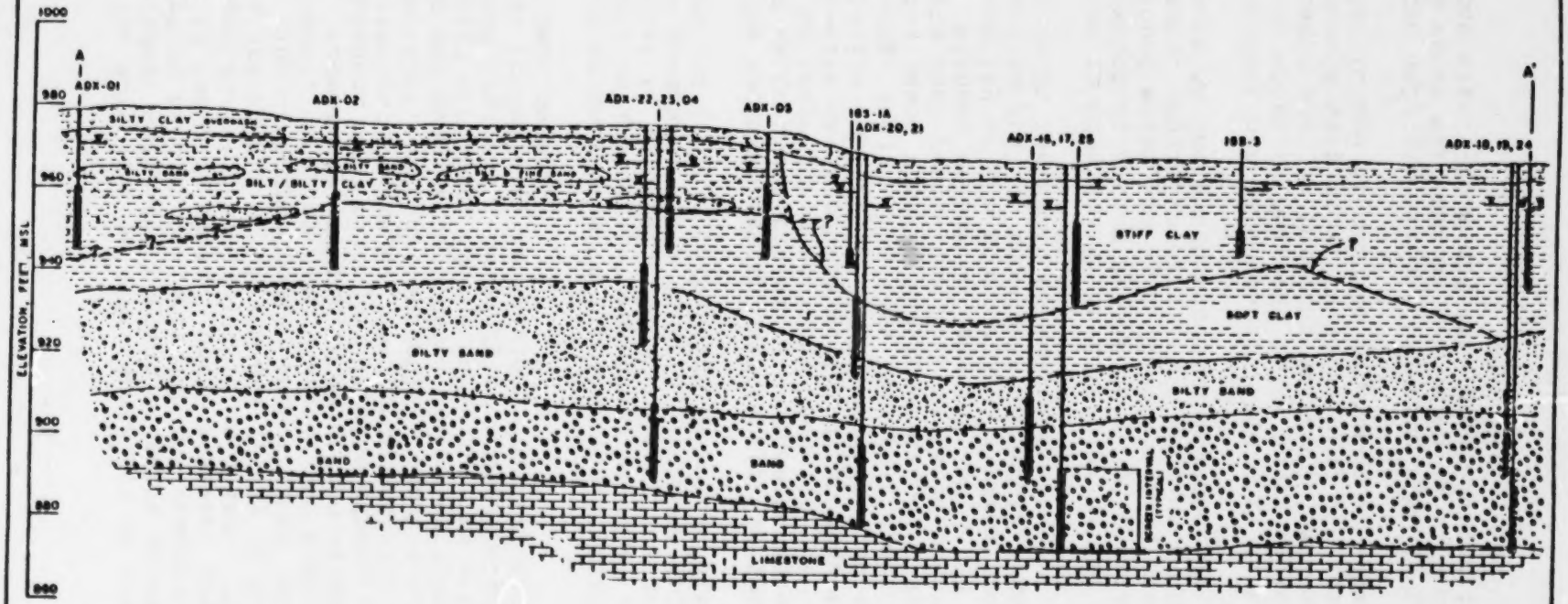

LEGEND

▽ MEASURED WATER LEVEL

BLACK & VEATCH
ENGINEERS-ARCHITECTS
KANSAS CITY, MISSOURI

HYDROGEOLOGIC CROSS-SECTION A-A'

FIGURE 3-21

The materials on Aidex which are of greatest concern are the pesticides, which are present in three general classes. The s-triazine herbicides (atrazine and prometon) are only moderately toxic in the pure state. Both, however, are manufactured from cyanogen chloride and cyanuric chloride. These precursor compounds are highly toxic and are likely to be present on the site. The organophosphorus insecticides (chlorpyrifos, diazinon, disulfoton, ethoprop, and phorate) are highly to very highly toxic, moderately soluble in water and relatively mobile in soils. They present both acute and chronic exposure threats to humans and vertebrate animals. The organochlorine pesticides (DDT, methoxychlor, aldrin, heptachlor, chlordane, dieldrin, toxaphene, endrin and pentachlorophenol) are ubiquitous in the site soils in widely different concentrations. The persistence of these compounds and their tendency to bioaccumulate is well known. Several (chlordane, heptachlor, and heptachlor epoxide) are known carcinogens.

An assessment of the onsite risks presented by the hazards at Aidex indicates that the greatest acute and chronic exposure potential is associated with the material contained in the two burial trenches. This material is accessible by inadvertent contact and is in a form which is easily dispersed if disturbed.

The second greatest on-site risk is posed by the contaminated ground water under the site. Although two contaminants were found in trace concentrations in an on-site monitoring well, the on-site water supply wells, which draw from the lower zone of the shallow aquifer, were not contaminated when last sampled (February, 1983). The fact that pesticides were found in soils from the lower zone at low concentrations during site investigations indicate that pesticides have migrated downward through the soil. Without effective remedial action to remove or stabilize the majority of the sources of contamination (the burial trenches and surface soils), the water under the site will eventually become unfit for human consumption.

The third greatest on-site risk is the contaminated surface soil, which is acting as a source for continued leaching into the ground water and is a direct contact hazard to any future occupants. Fugitive dust is of concern at the caretaker's residence at the south end of the property.

Another but less quantifiable risk is the Aidex building complex, which is believed to be contaminated with pesticide-laden respirable dust on interior surfaces, and contain materials impregnated with slowly volatilizing pesticides. In this case, the risk is one of chronic exposures to future site occupants.

The only significant off-site risk is that off-site ground water will become contaminated as a result of migration from the site. This off-site ground water is not presently

contaminated, but is hydraulically connected to the contaminated aquifer under the site. If this water should become contaminated, then the irrigation and drinking water supply for area residents may be adversely affected. At present this risk is thought to be low, due to the combination of the low velocity of water travel and the distance to the nearest user of potable water (about 4,000 feet).

Enforcement History

On November 23, 1980, pursuant to Section 3008 of the Resource Conservation and Recovery Act (RCRA), a Notice Of Violation (NOV) was issued to Aidex Corporation for failure to comply with the notification requirements of Section 3010(a) of RCRA. In response to the NOV, company officials indicated that the facility had ceased its operations and was being sold.

A civil action, pursuant to Section 7003 of RCRA, for cleanup of the site was filed on June 22, 1981. The action was stayed by the Bankruptcy Court for over a year under the automatic stay provisions of the Bankruptcy Act. During the pendency of the stay, efforts were made to secure site cleanup and to recover costs incurred through the bankruptcy court. The civil action was subsequently voluntarily dismissed without prejudice on March 6, 1984.

Enforcement-Current Status

Notice letters were sent to potentially responsible parties (PRPs) on February 6, 1984. At the request of the PRPs, a conference was held on March 13, 1984. Negotiations have failed to result in an acceptable offer to perform site cleanup or for reimbursement of costs incurred by EPA and the State. The EPA has developed a referral to the Department of Justice for civil litigation of this matter under Sections 104, 106, and 107 of CERCLA.

After the remedy for the site is selected and designed, EPA will offer the PRP's the opportunity to construct that remedy.

Alternatives Evaluation

The feasibility study evaluated remedial options which could be utilized for cleanup of the following areas of the Aidex site:

1. Buried wastes
2. Contaminated soils
3. Contaminated groundwater
4. Contaminated structures

The following criteria were used in evaluating the alternatives:

1. Effectiveness

2. Technical feasibility
3. Cost effectiveness
4. Impact to the environment

The goal of the proposed remedial program is to provide adequate protection for human health and the environment in a cost effective manner.

Buried Wastes:

Alternatives	Estimated Costs
1. No action	*
2. Capping	*
3. Fixation	$287,800.
4 Chemical detoxification	*
5. Excavation and on-site disposal	$240,000.
6. Excavation and off-site disposal (500-mile haul distance)	$249,100.
7. Excavation and off-site disposal (1000-mile haul distance)	$374,600.

* Alternative dismissed during initial screening phase of the Feasibility Study.
** The cost of on-site disposal does not include the cost to identify and correct problems with the foundation of the of the disposal facility.

The feasibility study report recommends that buried wastes be excavated and transported to an approved hazardous waste landfill for disposal. The excavation will be of soils in and immediately adjacent to the disposal trench and will clean up the soil to a residual concentration of less than 10 ppm. Following the excavation phase, the excavation area would be backfilled with clean compacted soil and graded and seeded to provide adequate stabilization. This alternative is technically feasible and is proven in practice. Based on a haul distance of 500 miles, which the Agency believes is the more likely alternative, this is marginally less expensive (as explained below) than the on-site disposal option, especially considering the uncertainties and risks associated with the cost estimate for the on-site option.

Under this option, the excavated wastes will be manifested and sent to an offsite landfill is in compliance with RCRA The selected landfill facility must have undergone a RCRA compliance inspection within the last 12 months and have no significant violations or other environmental conditions that affect the satisfactory operation of the facility. These facilities must meet the substantive requirements of Part 264 of the RCRA regulations. If the selected landfill facility has interim status, adequate water monitoring data should be available to assess whether the facility poses a threat to groundwater.

The no action alternative was not considered acceptable for reasons of adverse potential health and environmental impact. The trenches are believed to contain as much as 154,000 pounds of ethoprop, a soluble pesticide which has shown high mobility in soils similar to those found on the Aidex site. This alternative would not prevent migration of contaminants into groundwater which could eventually reach drinking water wells. The depths to the water table range from approximately 5 to 20 feet beneath the site and it is probable that buried wastes and contaminated soils at depth are periodically inundated with ground water.

Capping was not considered an acceptable alternative because the cap would only reduce surface water infiltration into the wastes. As stated above, the depths to the water table range from approximately 5 to 20 feet beneath the site and it is likely that wastes are and will continue to be periodically inundated with ground water. Therefore, a cap will not prevent offsite migration of contaminated groundwater.

Fixation would involve the treatment of buried trench wastes with one or more compounds such as portland cement, clays, flyash or charcoal which would either bind the soil and contaminants into a solid mass or effectively absorb the contaminants and restrict their migration. To date, this technology has not been proven to be feasible or reliable particularly for a complex mixture of pesticides which may be present in the trench. Fixation would require the soil to be finely ground and would require dust control during the soil preparation. The resultant material would exhibit reduced leachability, but some leaching would be expected to continue. The long-term mechanical integrity of the monolithic waste formation subjected to freeze and thaw cycles is unknown. Fixation was found not to be a technically feasible or reliable option.

The chemical detoxification alternative would involve the excavation of buried trench waste and the reaction of the waste soil with chemicals which could degrade the contaminants to non-toxic products. For pesticides the reaction is usually alkaline hydrolysis. The EPA has examined the practicality of using chemical detoxification methods for the disposal of small quantities of pesticides and found that certain organophosphorus pesticides could be detoxified readily while others produced toxic residues. Organochlorine pesticides were not found to be amenable to treatment. Because of the uncertain sucess of treating a mixture of pesticides, the the probability of creating toxic byproducts and large volumes of spent chemicals and the expected high cost, this alternative was not considered in the final evaluation.

The on-site disposal option was evaluated in detail. An above-grade landfill facility would be constructed due to the seasonally high water table at the site. This facility would comply with the RCRA permit standards specified in 40 CFR Part 264. Such a facility must include a multilayer cap and double-lined bottom with a leachate collection system. The Agency reviewed several possible design options for an on-site, above grade landfill facility and determined that the overall cost an appropriately designed facility is likely to be more expensive than off-site disposal. Although the engineering cost estimates indicated that the cost of an on-site facility was slightly less expensive than offsite disposal, these estimates did not take into account the fact that before constructing a landfill EPA would be required to conduct further evaluation of the ability of a subsurface clay layer to properly support the weight of the landfill and, depending on the results of the evaluation, to provide additional support for the landfill. When the costs of these additional efforts is added to the contractors cost estimates, EPA believes that offsite disposal will be marginally less expensive. The current cost estimates are so close, the additional risk of increased costs associated with the on-site option must be considered.

Contaminated Soils:

Alternatives		Estimated Costs
1.	No action	$ 0.
2.	Capping	865,700.
3.	Fixation	* 139,900. (10-100 ppm soils only)
4.	Excavation and on-site disposal	$2,160,000.**
5.	Excavation and off-site disposal (500-mile haul distance)	$2,241,900.
6.	Excavation and off-site disposal (1000-mile haul distance)	$3,746,000

* An extrapolated cost for fixation remedy for contaminated soils in excess of 10 ppm is approximately $275,000.

** The cost of on-site disposal does not include the cost to identify and correct problems with the foundation of the disposal facility.

The results of the Remedial Investigation have shown that soils at the site are contaminated in a complex three-dimensional matrix. There are several areas where more contaminated material is overlain by less contaminated materials; however, the general trend is decreasing contamination with depth. The range of concentrations across the site is large but some samples showed total pesticide concentrations up to 5100 ppm. At these levels, the pesticide compounds present an inherent hazard to various species of plant and animal life.

A study performed in 1970 as part of the National Soils Monitoring Program showed that Iowa farm soils contain residues of several organochlorine pesticides (aldrin, chlordane, DDT, dieldrin and heptachlor). While the average concentration was around 0.1 ppm, peak values ranged from 1-3 ppm for individual components. Soil samples collected in the plow zone of an ajoining farm field by the Iowa Geological Survey showed pesticides in similar concentrations: atrazine (0.08 ppm), dieldrin (0.23 ppm), heptachlor epoxide (0.06 ppm) and Treflan (0.06 ppm).

After a detailed review of current technical literature, Black & Veatch recommended that cleanup of contaminated soils be performed where total pesticide content exceeds 10 parts per million. Because this cleanup level approaches background levels for pesticides when compared with peak values for Iowa farm soils (referenced above) no capping of the remaining soils is necessary. Although a cap is not part of the remedy, the excavated area will be filled with approximately three feet of clean, compacted soil and graded. Thus, remaining residual levels of pesticides will be beneath the clean backfill. While this recommendation is based on engineering judgement, there are several reasons why this level should significantly reduce the risks of harm to human health and to the environment.

First, the cleanup of soils which exceed a total pesticide level of 10 ppm would assure that no single chemical is present at a level significantly higher than the normal field application rates for pesticides. This criteria was developed recognizing that pesticide applications to control pests have not, in general, had an adverse impact on human health, soil microorganisms, or ground water quality, and there are no regulatory limits on acceptable levels of a complex mixture of pesticides in soil.

Second, the cleanup of soils containing more than 10 ppm pesticides substantially reduces the amount of pesticides at the site which may cause harm or be available for transport to off-site receptors. An estimated 8,835 pounds of pesticides are contained in 9,900 cubic feet of soil in areas of the site where total pesticide content exceeds 10 ppm. This represents 98 percent of the total pesticide content in all surface and near-surface soils. By removing or otherwise managing this soil, only two percent of the original contamination remains.

Finally, the threat of groundwater contamination is reduced if the level of contaminants is reduced to 10 ppm at the site. The forty feet of fine-grained clays, silty clays, and silty sands are expected to attenuate low concentrations of pesticides to a large extent. Also, at that level natural biological degradation can occur. Research studies have shown that at low pesticide concentrations (below 50 ppm) microbial activity was generally not affected.

The on-site disposal option was evaluated in detail because its cost was estimated to close that of off-site disposal. An above-grade landfill facility would be constructed due to the seasonally high water table at the site. This facility would comply with the RCRA standards specified in 40 CRF Part 264. Such a facility must include a multilayer cap and double-lined bottom with a leachate collection system. The Agency reviewed several possible design options for an on-site, above grade landfill facility and determined that there are at least two significant uncertainties and risks associated with the cost-estimates for this option.

First, the RCRA guidance document relating to the standards for the cover design specify that the final cover have a slope of between three and five percent unless an alternate slope will effectively promote drainage and not subject the facility to erosion. For slopes exceeding five percent, the maximum erosion rate should not exceed 2.0 ton/acre using the USDA Universal Soil Loss Equation. One design option employing a cover slope much greater than the design guidance is estimated to cost $1.7 million, less than the cost of off-site disposal. This option was rejected, however, because of concerns over excessive soil erosion. Other design options with less steep cover slopes (but still exceeding the recommended design guidance) increase the estimated costs of constructing the on-site option significantly. The cost estimate for the on-site option is based on that design and is $2.4M. This compares to $2.49M for off-site disposal of the wastes and soils. However, the cost estimate for the onsite option involves more risk of cost increases than that for the offsite option because of the uncertainty described below.

The second significant uncertainty associated with the on-site facility concerns the stability of the soils which will provide the foundation beneath the facility. During the installation of on-site monitoring wells, a layer of soft clay 20 to 40 feet in thickness was found to be present beneath some portions of the site under the 20 foot silty-sand and gravel alluvial layer.

Because the weight of the landfill may exceed the load bearing strength of the sediments beneath it, and because the sediment is not homogeneous, the landfill may be subjected to uneven settling, possibly threatening the integrity of the liner. At this time, EPA does not have sufficient geotechnical information to fully evaluate the potential settling problem. Thus, there is a concern that the $2.4M estimate may underestimate the actual cost of constructing a stable facility. Thus, the offsite disposal option is considered marginally more cost effective than on-site disposal.

The no action alternative for soils above 10 ppm was not accepted because the risk of harm to human health and the environment would remain. The fact that major areas of the site remain devoid of vegetation several years after a cessation of operations

is symptomatic of the high residual levels in the surface soil layer. The U.S. Fish and Wildlife analysis of animal tissues documents the threat to fauna at the site. Without action, there would continue to be potential for migration of these pesticides into the ground water.

The capping alternative would involve grading the surface as necessary to provide drainage and the installation of a PVC liner covered by sand and earth. By restricting water infiltration, the driving force for downward migration of surface pesticides is reduced. However, the high water table could inundate the contaminated soil under the cap. This alternative is not recommended for adoption.

The fixation option was only evaluated for soils considered to be moderately contaminated (10-100 ppm total pesticides). Fixation would involve mixing the soil with a fixation agent (either activated charcoal or bentonite clay) and placing it evenly over the bottom of an excavation. Clean soil would then be placed over the fill. Studies by other scientists have documented the capability of both activated charcoal and bentonite to adsorb organic cations and thereby reduce their availability for leaching or uptake by plants and animals. However, these studies were performed on individual pesticides rather than on complex mixtures like those found at the Aidex site. The EPA received comments from the U.S. Army Corps of Engineers, from the Centers for Disease Control and from the State of Iowa all suggesting further consideration before selection of this alternative even though it appears to be the lowest cost option for management of a portion of the contaminated soils because it is an unproven technology and the longterm reliability is undocumented. The permanence, effectiveness, and reliability of the proposed fixation agents has not been established. For that reason, it is not appropriate for selecting as a remedial action.

The EPA selected the excavation and off-site disposal option for all soils contaminated in excess of 10 ppm total pesticides because this alternative offers a permanent and effective solution to the problem of soil contamination, reduces the level of pesticide contamination to near background levels, and is the most cost-effective alternative based on a 500-mile haul distance.

Contaminated Ground Water

Alternatives		Costs
1.	No action	$ 0.
2.	Periodic monitoring for 30 years with augmented well field.	875,000.
3.	Containment and treatment	1,532,000.

The no action alternative was rejected because contaminated ground water exists on the site and the potential for migration offsite, and eventually into drinking water supply, can not be discounted.

The Feasibility Study recommends that the periodic monitoring alternative be implemented. While ground water monitoring results to date do not indicate that contaminants are reaching the zone in the aquifer used for a drinking water supply, a longer term threat is presented. Soil sampling data does indicate downward migration of contaminants. Two additional wells will be needed at a cost of $15,000 to augment the current monitoring well network. This monitoring program will be sufficient to determine if and when contaminated ground water begins to migrate offsite, and thus will allow EPA to assess the need for additional protective measures in the unlikely event that significant migration occurs. Therefore, because the monitoring program is substantially less expensive than the cleanup and containment alternative, monitoring is the cost effective remedy to address the ground water concern.

The decision on whether containment and treatment of the contminated aquifer under the site is necessary is being deferred pending further analysis.

Contaminated Structures

Alternatives		Cost
1.	No action	$ 0.
2.	Vacuum interior of buildings	32,800.
3.	Vacuum and wash floors and walls	74,175.
4.	Moderate demolition	523,100.
5.	Heavy demolition	825,700.

During the final inspection of the Phase II IRM construction, it was noted that floors in several of the buildings are stained with residues, walls and rafters are coated with dust, and birds roosting in the building continue to die and drop to the floor. The roofs in several buildings leak so that rainwater makes large puddles on the floors some of which flows into floor drains which lead to septic tanks. Vandals have repeatedly broken into the buildings so the threat to human health and the threat of releases to the environment will continue if no action is taken to cleanup contaminated structures at the site.

The vacuum alternative involves the use of high efficiency vacuums to remove loose dust from accessible interior surfaces. This alternative was not selected because vacuuming alone would not remove spilled and dried residues from floors and walls. The recommended alternative for managing contaminated structures is to vacuum and wash floors and walls. Under this alternative floors and walls would first be vacuumed and then be washed using

soap and water or steam cleaning techniques. This alternative provides more assurance that the risk of exposure to humans will be reduced. This level of cleanup in considered minimal and will not necessarily assure that the buildings are suitable for occupation; however, the recommended additional cleanup of structures is the most cost effective level of cleanup when future use of the site is unknown.

Demolition would involve stripping interior panels and insulation from the buildings. These alternatives are far more costly and believed to be unnecessary given the unknown future use of the site.

Recommended Alternatives

Section 300.68(j) of the National Contingency Plan (NCP) (40 CFR Part 300) July 16, 1982, states that the appropriate extent of remedy shall be determined by the lead agency°s selection of the remedial alternative which the agency determines is cost-effective (i.e., the lowest cost alternative that is technologically feasible and reliable and which effectively mitigates and minimizes damage to and provides adequate protection of public health, welfare, or the environment).

Based on an evaluation of the cost effectiveness of each alternative as described above and on information from the State and U.S. Army Corps of Engineers, the EPA has determined that offsite disposal of contaminated soils and buried waste, thorough cleaning of buildings short of demolition and groundwater monitoring are adequate to protect public health and the environment, and are cost effective, technically feasible, and reliable. The total cost of the recommended option is $3,455,175.

Operation and Maintainance (O&M)

Once the final remedy has been implemented at the Aidex site, the only O&M activities required will be periodic monitoring of ground water monitoring wells to assure that the remedial measures are effective and that contaminants do not migrate into nearby water supply wells. The projected cost of sampling and analysis of monitoring wells biannually for 30 years is $875,000.

The State of Iowa will enter into a Cooperative Agreement for a one year period after the remedy is completed. Through the agreement, the State will match 10% of the O&M costs. After this one year period, the State will complete O&M activities at the site using State funds appropriated to the Iowa Department of Water, Air, and Waste Management.

Community Relations

The Remedial Investigation and Feasibility Study Report was made available to the public at six repositories between March 8, 1984 and March 29, 1984. The public was notified of the comment

period through a news release to area media contacts and through letters sent to persons who attended the public meeting held in May 1983, prior to the initiation of initial remedial measures. The EPA only received one comment from the public, but this comment did not pertain to the proposed remedial action. No comments were received from PRPs.

A public meeting is planned to brief citizens and officials on the selected alternatives for the final remedy at the site.

Consistency with Other Environmental Requirements

The proposed action will not require on-site treatment, storage, and disposal of hazardous wastes. The removal of pesticide-contaminated soils to near background levels of total pesticides will alleviate any need for capping of residual soils. Therefore, the proposed on-site excavation is consistent with the RCRA regulations. Off-site disposal of wastes will be in accordance with the appropriate RCRA regulations for transportation and disposal of hazardous wastes. This will include manifesting of wastes and shipment to a RCRA approved facility.

As discussed previously, a monitoring program will be implemented to ensure future migration is detected so that appropriate corrective measures can be implemented.

Schedule

4Q FY 84 - AA signs ROD
4Q FY 84 - Amend IAG for Design
1Q FY 85 - Start Design
2Q FY 85 - Complete Design
3Q FY 85 - Amend SSC and IAG for Construction
3Q FY 85 - Start Construction
1Q FY 86 - Complete Construction

Responsiveness Summary
Aidex Corporation Site

This document summarizes the comments received by the Environmental Protection Agency Region VII during the public comment period for the Remedial Investigation and Feasibility Study Report, Aidex Corporation, Council Bluffs, Iowa which was prepared by Black and Veatch Engineers-Architects. The public comment period was from March 8 to March 29, 1984. During this period, comments were received from the State of Iowa, from the U.S. Army Corps of Engineers, from the Centers for Disease Control and one comment was received from the public sector.

From the State of Iowa

Comment 1: The Feasibility Study does not propose a quality control program to assure that soils contaminated in excess of 10 ppm pesticides have been removed from the site. Of particular concern are soils in the area of the burial trenches, septic tanks and tile fields and soils below the three foot depth beneath certain "hot spots."

EPA Response: After an assessment of hazards present at the Aidex site, EPA has determined that soils contaminated to levels greater than 10 ppm pesticides should be excavated and removed from the site. The Feasibility Study recommends that the dimensions of areas of removal be based on the results of previous boring and sampling programs. While this is the most cost effective approach, EPA agrees that a limited sampling program should be undertaken during the design phase to determine whether significant contamination exists below the 3-foot level and so that the volume of soil to be removed can be more precisely calculated, and a more exact cost estimate can be developed. The EPA also agrees that sampling should be performed after excavation to assure that removal of contaminants to the designated level is complete.

Comment 2: The Feasibility Study states that the buildings are not useable in their present state and recommends that a sampling program be undertaken during the design phase. The cost of this analytical program is estimated to be $50,000. The State recommends that the interior surfaces and insulation be washed prior to a testing program. The testing program would then only be used to insure that buildings have been adequately cleaned.

EPA Response: The EPA agrees that it would be more cost effective to put dollars into the cleanup effort rather than an initial testing program. Since the buildings are not in use, the Agency plans to vacuum and wash the buildings to remove contaminated dust and spills and to delete the testing program. This will reduce the cost estimate for building cleanup provided in the Feasibility Study by approximately $74,000.

Comment 3: The Feasibility Study recommends that a treatability study for fixation of moderately contaminated soils be performed during the design phase. The State believes that such works should have been done during the Feasibility Study phase so that a more accurate cost estimate could have been prepared for the Feasibility Study Report and so that all remedial alternatives could be evaluated together.

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EPA Response: The EPA has determined that fixation of contaminated soils or wastes at the Aidex site would not be a reliable remedy. Therefore, treatability studies are not needed in the design phase.

From the Public

Comment: EPA should collect and statistically analyze health data from persons who worked at the Aidex site as well as from persons who live nearby to determine whether the site has caused any adverse health effects. The EPA should continue to monitor the health of former employees for some time into the future.

EPA Response: EPA is interested in environmental concerns which affect community health and will provide this comment to the federal agency whose mission is to evaluate health problems, the Centers for Disease Control in Atlanta, Georgia.

From the Corps of Engineers

Comment 1: The Corps recommends that additional explorations and sampling be accomplished during the design phase. Locations of trenches and quantities of wastes indicated by geophysical methods during the remedial investigation should be confirmed by borings or test pits. Also, the wastes must be identified and this information included in the bid package so that an appropriate disposal facility may be identified and priced.

EPA Response: EPA agrees with this comment and will request that the Corps incorporate these items into the workplan for the design phase.

Comment 2: The Corps believes that it would be prudent to undertake some sampling and analysis of soils below the three foot level during the design phase to better estimate the extent of contamination and the volume of soils to be removed.

EPA Response: See response to Comment 1 from the State.

Comment 3: The Corps has reservations pertaining to the proposed fixation technique because there is not sufficient, up-to-date, supporting information presented in the Feasibility Study (FS) Report to conclude that fixation will adequately reduce the hazard to acceptable levels.

EPA Response: EPA has reviewed the proposal in the FS and reached the same conclusion. The cost of a treatability study (estimate - $50,000) will be applied toward the removal of moderately contaminated soils.

Comment 4: The FS Report discounts any risk/hazard associated with the septic system which served the Aidex building complex. The Corps feels that septic system components should be located during the design phase and sludges in septic tanks and soils around laterals should be sampled to determine whether removal is necessary.

EPA Response: EPA will request that the Corps incorporate these recommendations into the design workplan.

Comment 5: The FS report does not provide a cleanliness criteria for buildings at the site. This should be determined during the design phase. The Corps does not recommend the extensive sampling program proposed in the FS Report but rather a limited sampling program during the design phase to estimate the amount of demolition necessary. Then following cleanup work, the buildings should be sampled to assure that they were adequately cleaned.

EPA Response: EPA has given careful consideration to the level of cleanup which should be performed in buildings at the site and has decided to vacuum and wash down building interiors without an additional testing program. These measures will remove contaminated respirable dust and materials spilled on walls and floors. While this remedial approach is the minimum amount of work necessary to protect the health of future site occupants, it is the most cost effective and environmentally sound approach when the future use of the site is unknown.

Comment 6: In addition to the two groundwater monitoring wells recommended in the FS Report, the Corps recommends that an additional two-well cluster be installed near the bluff, south of the road along the south boundary of the site.

EPA Response: Groundwater flow away from the site has been shown to be toward the west and southwest toward the Missouri River. The wells proposed by the Corps are outside of the zone of contamination or potential contamination from the site and the Agency considers them unnecessary in order to protect human health and the environment.

From the Centers for Disease Control:

Comment 1: The Centers for Disease Control (CDC) recommends that the proposed fixation option for soils contaminated between 10 and 100 ppm total pesticides be reconsidered by the Agency before selecting this option. CDC believes any decision to select this alternative should be based first on past studies demonstrating the long term effectiveness of the charcoal fixation agent in similar soils, and second on preliminary onsite testing to determine its effectivenss.

EPA Response: See EPA Response to the Corps' Comment 3.

Comment 2: A risk assessment should be performed to determine whether the soil pesticide levels at the 1 to 10 ppm range could adversely affect human health through any potential onsite routes of exposure if these soils are left in place on the site. This assessment should be performed for each of the more highly toxic pesticides found. Legal application rates of different pesticides on various land uses and plant residual standards could be used to help assess the significance of the 1 to 10 ppm range.

EPA Response: The Agency believes that a risk assessment has been performed to the extent possible for soils contaminated with pesticides in the 1-10 ppm range. Application rates, leachability rates and health effects were all considered during the risk assessment although the synergistic effects of the pesticide mixture could not be calculated.

Comment 3: CDC agrees with the recommended action for continued groundwater monitoring. CDC believes this monitoring is warranted based on sampling information to date.

Community Support for the Remedy

No public meeting was held during the public comment period because none was requested. However, during the public meeting held in May 1983 prior to the initiation of initial remedial measures, community leaders and citizens voiced their support for the Agency's efforts to clean up the site. They asked to be kept informed as the work progressed. The EPA and the Corps of Engineers have worked together to provide information on a frequent basis to the community. A monthly progress report has been provided to the Mills County Auditor in Glenwood, Iowa. She also maintains an information repository on the project.

A public meeting is planned in the near future to provide details of the final remedial program at the site.